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PRIEST RIVER EXPERIMENTAL FOREST

By Robert W. Mutch
Intermountain Forest and Range Experiment Station
Ogden, Utah

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Bob Mutch

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1960 ANNUAL REPORT -- PRIEST RIVER EXPERIMENTAL FOREST

INTRODUCTION

The research potential of the experimental forest was fully realized during 1960, as Priest River approached an historical milestone. For 1960 marks the eve of Priest River's 50th anniversary. The experimental forest was founded in the fall of 1911, with the initial physical plant consisting of a tent camp. In 49 years this early camp has expanded into the present administrative site composed of four residence buildings, office, cookhouse-bunkhouse, shop, and storage buildings.

Through the years the research program at Priest River has also expanded. However, in recent years the facilities at Priest River have not always been fully utilized. This decentralization of research projects might be partly explained by the improved transportation facilities now available to research workers. With an extensive forest road network and rapid transportation methods, the researcher today is much more mobile than his counterpart of 20 and 30 years ago. This increased mobility has broadened the researcher's area of study. He is no longer confined to a specific location, but now can easily investigate his problem throughout an entire region.

Increased mobility should not necessarily preclude the benefits to be derived from concentrated research efforts at an experimental forest. That experimental forests can still function as an active focal point of research efforts was proven during the 1960 field season at Priest River. Twenty-nine researchers and research assistants conducted studies in forest management, forest disease, forest fire, and wildlife problems at the experimental forest in 1960. This field season was both active and varied as evidenced by:

western white pine vigor-quality plots and forest management thinning plots maintained and measured--data collected from moisture stress seedling study, blister rust micro-climate study continued, white pine needle blight plot established, sheltered pole blight plots maintained--logging slash plots burned and analyzed, fuel moisture studies continued, large log study terminated in October--Dr. Kenneth Hungerford and Paul Edgerton of the University of Idaho conducted a grouse brood range survey.

Research studies do not always follow a pre-conceived timetable or schedule. Unexpected events occur that must be handled immediately. Several of the above studies benefited materially in this respect because the researcher "lived with his work."

The experimental forest also serves as a common meeting ground for foresters and a demonstration area for visitors. On August 1, four Forest Service Experiment Stations were represented at Priest River: George Fahnestock, Southern Station; Al Foster, Southeast Station; Don Leaphart, Central States Station; and personnel from the Intermountain Station. Mr. and Mrs. A. O. Lawrence of Victoria, Australia, visited the experimental forest in early August. Mr. Lawrence is Chairman of the Forest Commission in Victoria. Richard E. McArdle, Howard Johnson, and John Beebe viewed the burning of logging slash plots on the evening of August 11.

RESEARCH ACTIVITIES ON THE PRIEST RIVER EXPERIMENTAL FOREST

FOREST MANAGEMENT RESEARCH

The western white pine vigor-quality plots were measured and weeded by Burt Barnes, Phil McDonald, and Stan Carpenter. This work was carried out August 29, September 2, and September 26-28.

The maintenance and measurement of thinning plots 179, 180, and 181 was partially completed during the fall of 1960. The remaining measurements will be obtained in 1961.

Determining the specific gravity of grand fir samples kept the drying oven at Priest River in operation through much of the fall and early winter of 1960. When the oven dry weight had been obtained, the specific gravity of each wood sample was computed on the basis of dry weight and green volume. These samples were collected at intervals along grand fir stems. The specific gravity measurements of the stem samples will be correlated with specific gravity at breast height. This specific gravity information is one part of an overall study aimed at "providing a means of estimating the yield capacity of grand fir sites and predicting the growth and yield of even-aged grand fir stands in the Intermountain area."

Since grand fir is an important pulp species, the yield of fibers in tons per acre is often a more meaningful figure than the usual volume yields. A supplementary study was initiated to develop tables giving weight yields. This study involves the conversion of wood specific gravity at breat height (measured from increment cores) to total tree specific gravity.

The prolific white pine seed tree located at area 63 produced approximately 27 cones in 1960. This is considerably under the 96 cones counted in 1959.

FOREST DISEASE RESEARCH

The moisture stress seedling study has been maintained at the experimental forest for several years. During August and September of 1960 data were collected and this project was terminated. The objective of this study is to determine the effect of soil moisture deficiency on rootlet mortality and

root development of western white pine, Douglas fir, grand fir, western red-cedar, and western larch grown on three types of soils (one having a rocky subsoil, one having a hardpan subsoil, and one having a deep, well drained subsoil). The physical layout of this study included twelve seedling beds, with each bed containing five seedlings of each of the five species. During the snow-free period of the year, a polyethylene shelter was erected over the seedling beds. Six beds received moisture deficiency treatment and six beds were hand watered. Each of the three soil types was replicated twice for each moisture treatment.

This study has important implications since the rootlet mortality study of western white pine showed that rootlet mortality in the 60- to 80-year age class is highly correlated with pole blight severity. Rootlet mortality was also found to be more severe on sites with shallow soils and low available moisture capacity. This study combined with other root studies should clarify the effect of soil moisture stresses on root mortality and on growth of western white pine and associated tree species.

In early July, a Priest River contractor excavated soil from along either side of the nursery beds in preparation for the root washing portion of the study. The actual root washing to remove the seedlings from the twelve beds began in August under the direction of Ed Wicker. As seedlings were washed out of the beds they were fastened to a grid background and photographed. These individual seedling photographs indicate the rooting habits of each species grown under specific moisture and soil type treatments.

Root and rootlet mortality data were collected for all species and treatments. Another important phase of the study was the determination of the ratio of root material (oven dry weight) to shoot material (oven dry weight) for each

seedling. The shoot material consisted only of the needles. This ratio then provides a measure of the weight of absorbing surface to transpiring surface.

Figure 1.--Moisture stress seedling study.

Certainly the most time consuming portion of the study was the stripping of roots and needles from the seedlings to obtain the root/shoot ratios. All needles were handpicked from each seedling and oven dried. The roots were divided into five size classes and oven dried. The Priest River "needlepluckers," however, very capably handled this tedious chore, allowing for the completion of the field work on schedule in mid-September. Populating the "needlepluckers'" work tent were Scott Brown, John Trojonowski, Jim Baiar, Kristian Wales, Millie Kimery, Sally Mutch, and Joan and Bob Bartz. Several visitors and innocent by-standers were occasionally "shanghaiied" for temporary duty in the tent: Jean Fahnestock, Mary Dieterich, and children from the Fahnestock, Wellner and Leaphart families.

Harry Morton, a summer field assistant, collected a majority of the root and rootlet mortality data and assisted in all phases of the project. Don Leaphart and Ed Wicker supervised the project and carried out most of the root washing.

A western white pine needle blight plot was established in a young white pine stand just north of the Fox Creek-Priest River confluence. This bagging study of 10 white pine trees is designed to determine the life cycle of the causative organisms of white pine needle blight.

Merle Lloyd continued his micro-climatological study of blister rust at the experimental forest during the 1960 field season. The purpose of this summer's project was to study the effect of dew on rust intensification on several ribes plants along Benton Creek. This study was instrumented with two dew gages and a hygrothermograph.

FOREST FIRE RESEARCH

Two long term fire studies were completed at Priest River in 1960. Extreme weather conditions in July proved beneficial to both studies. The driest and hottest July on record at Priest River permitted the successful burning of the logging slash plots at an earlier date than ever before possible--July 23. This starting date provided for the completion of the burning tests before the onset of unusually early August precipitation. The July drought period also produced the critical fire-weather needed to round out the large log moisture content study.

The concluding logging slash experiments involved the burning of 5-year-old plots to test the effect of age of various species and amounts of logging slash fuels on flammability. The final analysis of the 1960 tests is not completed, but preliminary results indicate:

1. Fuel flammability is generally lower in 5-year-old slash, although the greatest reduction occurs during the first year following timber cutting.

2. In light slash plots (7.5 tons per acre dry weight) fuels have deteriorated to such an extent in five years that there is virtually no fire spread.

3. In medium and heavy slash plots (20 and 32.5 tons per acre dry weight respectively) fires will spread at moderate rates and burn with considerable intensity. The experiments show that when sufficient dry fuel is present, such as is the case in medium and heavy slash plots, aging 5 years does not reduce flammability in all species to low levels.

In 1942 a group of 5-foot log sections was laid out at the Priest River Experimental Forest primarily to compare the drying and wetting curves with actual weather factors for each year. Weight and moisture content observations have been determined annually from the time the logs emerge from the snow in the spring until they are covered again in the fall. This study was concluded at the end of the 1960 field season for final analysis.

A study concerned with the variation of moisture content in large fuels as measured by 10 mm. increment borings and cross-section slabs was initiated during July. The purpose of this study was to test the validity of measuring moisture content of large fuels by taking small samples. The study area was located on state land near the Middle Fork of the East River.

Critical burning conditions throughout July followed by an early August break in fire-weather characterized the 1960 fire season at Priest River. Idaho's Climatological Summary for July, 1960 indicates the severe conditions which existed over the state:

> This was one of the hottest months on record in Idaho and, until the final two days, very dry. The absence of significant rainfall during most of the month, following the unusually light rainfall in June, combined with high temperatures to produce critical fire-danger conditions on forest and range lands.

However, above normal precipitation was reported practically statewide in August, alleviating the serious July burning conditions.

Based on cumulative severity index, the 1960 fire season at Priest River rated at 109 percent of normal severity. The monthly normality percentages are more indicative of the true nature of the season:

Month	Percent of normality
June	152
July	126
August	73
September	106

FIG. 2 --Forest Fire Seasonal Severity--Priest River Experimental Forest

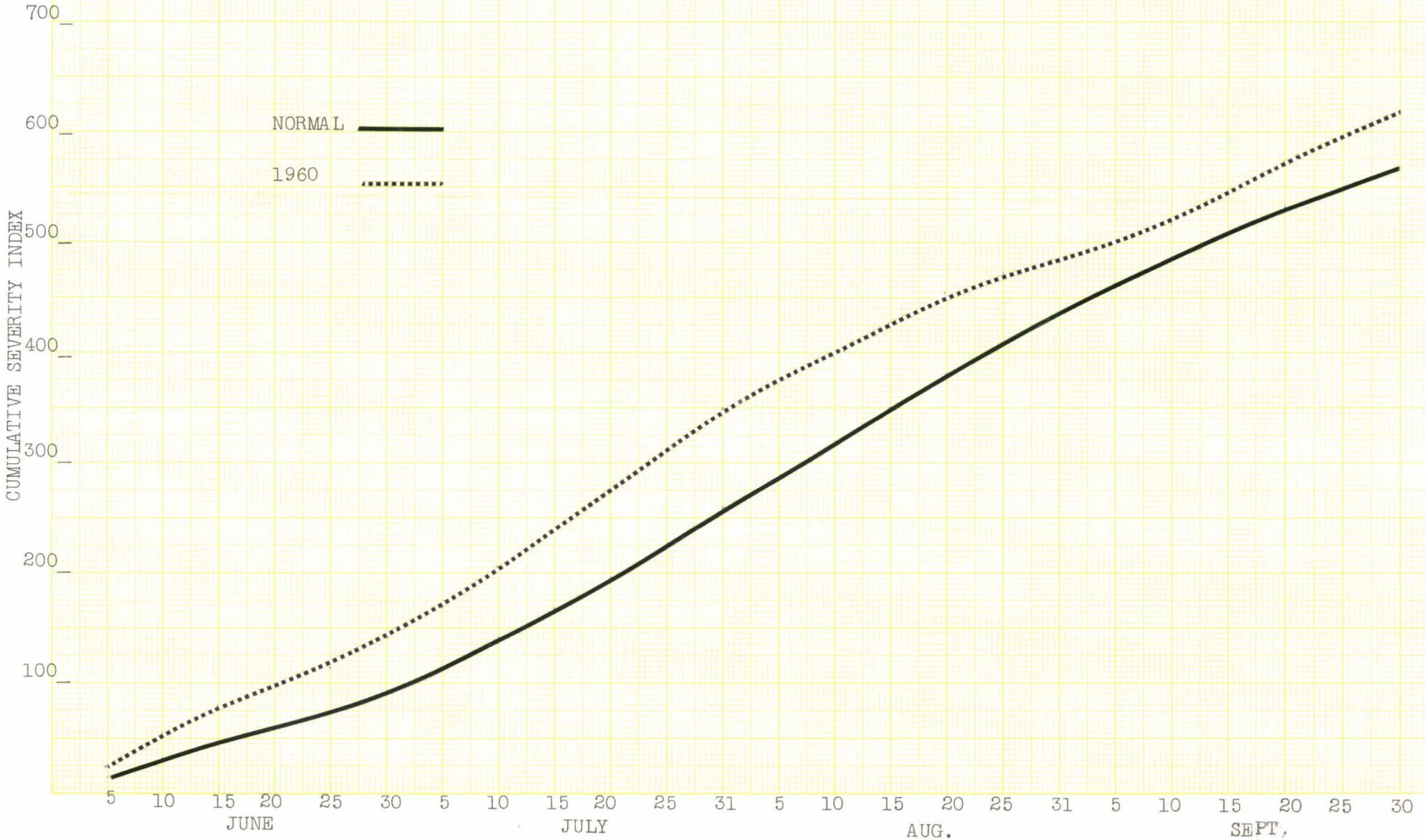

Table 1.--1960 weather summary, Priest River Experimental Forest

Month	Precipitation		Temperature			
	Normal	1960	Normal ave. max.	1960 ave. max.	Normal ave. min.	1960 ave. min.
	inches		degrees F.			
Jan.	3.88	3.11	30.5	27.0	16.9	13.8
Feb.	2.88	2.33	36.4	36.3	17.5	18.8
Mar.	2.67	3.84	46.3	45.1	23.9	23.1
Apr.	2.04	2.18	58.0	55.9	29.5	30.6
May	2.16	4.10	66.9	61.2	36.0	37.3
June	2.39	.97	74.3	75.1	42.0	41.3
July	.93	1/ Tr	83.6	2/ 88.4	45.0	46.2
Aug.	.97	1.81	82.0	74.3	43.1	44.2
Sep.	1.67	1.19	70.4	73.4	37.4	36.7
Oct.	2.94	2.93	56.4	58.2	31.6	32.5
Nov.	3.63	3/ 8.58	39.9	39.9	26.4	26.2
Dec.	4.25	1.74	32.3	30.1	20.6	21.9
Annual	30.41	32.78	56.4	55.4	30.8	31.0

1/ Previous low was .03 inches in 1929.
2/ Previous high was 87.8 degrees in 1925.
3/ Previous record was 7.79 inches in 1959.

Table 2.--Snow depth and water content, 1960, Priest River Experimental Forest

Month	Benton Meadow Course		Benton Spring Course	
	Depth	Water content	Depth	Water content
	inches		inches	
Jan.	14.13	3.67	32.2	8.4
Feb.	20.73	5.17	44.4	11.1
Mar.	21.5	4.8	52.2	16.5
Apr.	4.5	1.3	54.2	16.8
May	- Bare -		39.7	15.8

Table 3.--Precipitation at three stations on the Priest River Experimental Forest, 1960

Month	Control	Benton Dam	Benton Spring
Jan.	3.11	3.57	3.57
Feb.	2.33	2.47	3.09
Mar.	3.84	4.15	4.63
Apr.	2.18	2.49	3.02
May	4.10	3.99	5.14
June	.97	1.04	1.26
July	0	0	0
Aug.	1.81	1.68	2.22
Sep.	1.19	1.22	1.17
Oct.	2.93	2.63	3.01
Nov.	8.58	8.71	9.35
Dec.	1.74	1.80	1.83
Annual	32.78	33.75	38.29

ADMINISTRATIVE ACTIVITIES

MAINTENANCE AND OPERATIONS

The maintenance of the physical plant at Priest River is a continuous job, but not an impossible job. With realistic support the facilities at the experimental forest could adequately serve researchers for many years to come.

Milo Coons returned as caretaker in 1960 and carried out the maintenance program with his usual thoroughness. The top priority maintenance job was the repair of the cookhouse foundation. At some time in the past, soil had been filled in around the cookhouse foundation above the level of the sills. Dry rot spread through the sills and into the joists, subflooring, and flooring at the north end of the building. The floor joists had become crumbly, causing the north end to settle three inches.

Estimates for a contracted repair job ran between $800 and $900. Since the estimates exceeded available funds, on June 16 Milo and Lloyd Orr, a temporary laborer, undertook the repair work themselves. The objective was to replace all rotten wood with sound material and reduce the threat of dry rot by preventing the soil from coming into contact with the wood. The building was jacked up and all rotten wood was removed. The sills, joists, and subflooring received two coats of Penta before being put into service. The concrete foundation piers were entirely serviceable, and provided a satisfactory footing for the new construction work. Following the installation of sills, joists, and flooring, 14-inch aluminum flashing was placed around the entire foundation to prevent contact of soil and wood.

Cost of cookhouse foundation repair:

Lloyd Orr's time-- 81 hrs. at $1.81/hr.	$146.61
Lumber	64.33
Flooring	18.58
Aluminum flashing	27.60
Total	$257.12

Figure 3.--Cookhouse with aluminum flashing at soil level and new bottom course of shingles.

A leakage in the water supply pond was repaired on July 13 with two fourteen foot cedar logs, tar paper, and sand bags. At this same time the spillway boards were removed and the accumulation of silt in the pond was removed with the aid of the Pacific pumper. All screening in the intake box was removed and replaced with new copper screen and hardware cloth.

Two temporary workers established a lawn in front of residence #4 in June. This is the area that had been excavated during the fall of the previous year for a new sewer line.

The lecture room in the office and the trim on residence #4 were painted in July.

A salvage scale was let to Roy Turnbull of Priest River for the removal of blowdown and bug-killed timber. Totals for the sale consisted of:

Species	Volume MBM	Cost		
		Stumpage	Slash	Total
WWP	14.88	$111.60	$29.76	$141.36
L-DF	7.87	15.74	15.74	31.48
H-GF	1.13	1.13	2.26	3.39
Total	23.88	$128.47	$47.76	$176.23

COOPERATION

A Falls Ranger Station road crew completed the N-7 road during the spring of 1960. This road had not been completed at the time of the original road construction because of a stretch of difficult rock work. The N-7 road now connects the Center Ridge Road with the Benton Creek Road. This same crew also widened the turn around at the Benton Creek gaging dam.

On July 31 and August 1 a crew from Falls conducted right-of-way brush spraying along the Canyon Creek and Crow's Nest roads.

PERSONNEL

A change in superintendents brought Stan Carpenter to the experimental forest in September of 1960. Stan is no newcomer to Priest River, having served as a field assistant in fire research during the summer of 1958. Bob Mutch, the former superintendent, transferred to the Northern Forest Fire Laboratory in Missoula in mid-October.

Researchers and research assistants at the experimental forest in 1960 included Merle Lloyd, Don Leaphart, Jim Kimmey, Ed Wicker, Harry Morton, John Trojonowski, Scott Brown, Jim Baiar, Joan Bartz, Bob Bartz, Sally Mutch, Millie Kimery, Kristian Wales, Art Brackebusch, Jack Dieterich, Mike Hardy, George Fahnestock, Dave Olson, Don Fuquay, Jerry Parker, Phil Kimery, Chuck Kaehn, Ray Boyd, Burt Barnes, Phil McDonald, Jim Hanover, Don Fosket, Ken Hungerford, and Paul Edgerton.

A General Research Inspection brought George Jemison, Thomas McLintock, Thomas Buchanan, Jim Kimmey, Chuck Wellner, and Bob Callaham to the experimental forest on July 22-23.

Visitors to the experimental forest in 1960 were Bob McMinn, British Columbia; Dr. Daubenmire and an ecology class of 18 students; Mrs. James Kimmey; Dr. Charles Shaw; Mr. and Mrs. A. O. Lawrence, Australia; Carl Krueger; Ken Keeney; Al Foster, Southeast Station; Richard McArdle; Howard Johnson, John Beebe; Lewis Folsom; Chuck Wellner and family; E. G. Crosthwaite, U.S.G.S., Boise; Ernst Brender and Karl Wenger, Southeast Station; Dr. Baki Kasaplegil, Mills College; H. A. Brischle, Diamond National; Doris Keith; Marie Van Loon; Margaret Cunliffe; Dagmar Nelson; Phil Johnson; Dr. C. Wang, Frank Pitkin, Richard Reid, Robert Williamson, University of Idaho; and Wayne Travis, U.S.G.S.

Six rather special individuals spent some time at Priest River, for the experimental forest was a "Honeymooner's Haven" during the summer of 1960. Bob and Joan Bartz, the lookouts on Gisborne, were married May 28, 1960. Both fire assistants were married during 1960--Phil and Millie Kimery on June 8, and Jerry and Diane Parker on July 16.

Figure 4.--The 1960 Priest River family.
First row: Jerry Parker, Ed Wicker, John, Jean, Polly, and Peggy Fahnestock, Phil Kimery, Henrietta (field season mascot), Scott Brown, Jim Baiar.
Second row: Bob Mutch, Jack Dieterich, Merle Lloyd, Sally Mutch, Mary Fahnestock, Millie Kimery, Mary Dieterich, John Trojonowski, Milo Coons, Art Brackebusch.
Third row: George Fahnestock, Harry Morton, Don Leaphart.